



# A quantitative longitudinal study to explore factors which influence maternal self-efficacy among Chinese primiparous women during the initial postpartum period

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## ABSTRACT

**Background:** parenting during infancy is highly problematic for Chinese primiparous women. As an important determinant of good parenting, maternal self-efficacy (MSE) should be paid more attention by researchers. At present, the limitations of previous research about MSE during infancy are that the factors which influence MSE remained poorly explored, there were few studies with Chinese women, and the studies did not consider the effect of different cultures.

**Objectives:** to explore factors which influence MSE in primiparous women in China in the first three months postnatally.

**Methods:** a quantitative longitudinal study using questionnaires was conducted. In total, 420 Chinese primiparous women were recruited in obstetric wards at three hospitals in Xiamen City, Fujian Province of China. Initial baseline questionnaires to measure socio-demographic and clinical characteristics were distributed to participants face-to-face by the researcher on the postnatal ward at three days postnatally. Follow-up questionnaires at six and 12 weeks postnatally were sent via e-mail by the researcher to participants, including the Self-efficacy in Infant Care Scale (SICS), the Edinburgh Postnatal Depression Scale (EPDS) and the Postpartum Social Support Scale (PSSS) to measure MSE, postnatal depression symptoms and social support, respectively. These were returned by participants via e-mail. Quantitative data were analysed using SPSS.

**Results:** the variables: social support, women's satisfaction with 'Doing the month', postnatal depression, maternal education, baby health, and maternal occupation had an influence on MSE at six weeks postnatally (Adjusted  $R^2 = 0.510$ ,  $F = 46.084$ ,  $P < 0.01$ ); and the variables: postnatal depression, social support, baby health, women's satisfaction with 'Doing the month', and baby fussiness were the factors influencing MSE at 12 weeks postnatally (Adjusted  $R^2 = 0.485$ ,  $F = 41.082$ ,  $P < 0.01$ ).

**Conclusions:** obstetric nurses and women's family members need to be aware of the significant contribution of social support, women's satisfaction with 'Doing the month' in positively influencing primiparous women's MSE, and the significant effect of postnatal depression symptoms in negatively impacting on first-time mothers' MSE; they should pay more attention to primiparous women with less education, unemployed mothers, women with unskilled occupations, women with an unhealthy baby, and women with a baby with a difficult temperament to improve their comparatively lower MSE levels during the initial postnatal period.

## Introduction

With its huge total population, 1.40 billion (WHO, 2015), China has 860 million women and children, the largest number in the world. Since the implementation of the one-child policy during the past three

decade, more than half of Chinese parturient women are primiparous and lack previous parenting experience. Researchers have found that there are many parenting problems during infancy for Chinese primiparous women, including negative mother–infant interactions and difficulty with parenting tasks (Pan and Bao, 2006). Competent

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parenting is extremely important for infants during this early stage of childhood. If appropriate and positive parenting cannot be provided during infancy, children may experience intellectual, behavioural and emotional problems, which may negatively affect their wellbeing in the future (Çalışır and Karaçam, 2011).

Maternal self-efficacy (MSE) is the belief a mother holds about her capabilities to organise and execute a set of tasks related to parenting a child (Montigny and Lacharite, 2005). Strong evidence highlights that MSE is a significant determinant of good parenting, and is associated with a variety of outcomes for mothers' wellbeing and their children's development (Haslam et al., 2006). Therefore, as an important predictor of parenting, MSE should be paid more attention by researchers. However, the critical limitations of previous international research on MSE during infancy are that most studies were conducted with a homogeneous sample, and there was a lack of consideration for the effect of different cultures (Zheng et al., 2015). Furthermore, the factors influencing MSE have still been poorly explored. For example, some research had a small sample size (Porter and Hsu, 2003; Kohlhoff and Barnett, 2013), only focused on one time point (Shorey et al., 2015; Azmoude et al., 2015) and only related to a few characteristics of mothers or their children (Biehle and Mickelson, 2011; Shorey et al., 2015).

According to the process model of parenting by Belsky (1984) and the results of a literature review (Salonen et al., 2009; Denis et al., 2012; Shorey et al., 2014, 2015), the potential factors influencing MSE could be divided into maternal variables, infant variables and social contextual variables. The maternal variables which may influence MSE included maternal age (Tarkka, 2003), educational level (Jackson, 2002), employment status (Koniak-Griffin et al., 2006), mode of birth (Loto et al., 2010), postnatal depression (Salonen et al., 2009), parenting experience (Ngai et al., 2011), and the number of children (Shorey et al., 2014). Infant variables included infant gender (Kohlhoff and Barnett, 2013), infant health (Salonen et al., 2009) and infant temperament (Denis et al., 2012). Social contextual variables included social support (Leahy-Warren et al., 2012) and family income (Shorey et al., 2015). Furthermore, Ngai et al. (2011) recommended that it was necessary to consider the effect of culture on MSE, such as the traditional practice of 'Doing the month' in China. However, conflicting evidence about whether these factors affected MSE or how they affected MSE has been presented in the literature (Zheng et al., 2015).

It was noted that 'Doing the month' has derived from Chinese Traditional Medicine beliefs of the Yin-Yang principle. If Yin and Yang are in balance, one will be in good health; otherwise an imbalance will result in poor health. During the postnatal period, it is acknowledged that a woman is in a state of extreme imbalance towards Yin, a weakened condition (Chu, 2005). Consequently, she should avoid adding more Yin into her body, such as contact with wind, cold water and eating cold food. On contrast, she needs to eat more Yang-related, hot protein-rich foods that help to strengthen her body, such as fish soup and sesame oil chicken. Apart from dietary measures, in order to recover energy lost from the childbirth and to reduce the likelihood of developing illness, women are asked to have complete rest at home, avoid any physical work and are usually accompanied by mother-in-law or their mother for support (Zheng et al., 2013).

There was one paper published in Chinese which related to the factors influencing MSE for Chinese women in mainland China (Zang and Shen, 2010). However, its sample only focused on well-educated, high-income women in Beijing, and the factors influencing MSE were not explored thoroughly. Furthermore, it did not refer to the Chinese postnatal culture of 'Doing the month' with potential effects on Chinese primiparous women's MSE (Ngai et al., 2011). Therefore, this quantitative longitudinal study was conducted to thoroughly explore the factors influencing MSE among Chinese primiparous women in mainland China, taking into consideration of 'Doing the month' during the first three months postnatally.

## Method

### Design

The quantitative longitudinal study was conducted to thoroughly explore the factors which influence MSE in primiparous women at six and 12 weeks postnatally in China.

### Setting and recruitment

This study took place on the obstetric wards of three hospitals, located in Xiamen City, Fujian Province in South-East China. There were 90–100 beds and approximately 2000 annual live births in the obstetric wards in each study hospital.

Recruitment was conducted from June to July 2013. After obtaining all of the research permissions, an introductory presentation of this study was offered to all nurses in the three hospitals. Posters and leaflets were strategically distributed within the obstetric wards to inform all women and their family members once they were admitted to the three hospitals. All potentially eligible women were invited to participate if they fulfilled the inclusion criteria, which were: 1. Being postnatal women, aged 18 years or over; 2. Having a healthy full-term live infant (37–42 weeks gestation at birth, weight 2500 g or more, Apgar score > 7, without any deformity and disease); 3. Living in the Xiamen area; 4. Having the ability to speak, read and write in Mandarin. Exclusion criteria were: 1. Women whose baby was seriously ill or died; 2. Women with a severe physical or mental illness. The researcher contacted and approached eligible postnatal women as early as possible after childbirth, gave them an information sheet, and answered their questions about the research. The researcher acquired participants' written informed consent before data collection.

It is recommended that five to 10 participants per independent variable would be a suitable size to ensure stable test parameters in a multivariate analysis (Wang, 2003). This study used multivariate analysis, and the numbers of the independent variables that potentially influence MSE were estimated up to 20. Therefore, the maximum sample size of this study could be 200. Evidence from previous studies undertaken in China showed that an average attrition rate at one time point was approximately 27% when using email or mail (Zang and Shen, 2010). Since at six weeks and 12 weeks postnatally, collecting data was by e-mail or mail in this study, it was conservatively estimated to be at a 30% loss to the follow up at every time point (70% response rate at the first time point of follow up and 49% response rate at the second time point of follow up), so the predetermined recruited sample size was  $200/49\% = 410$ .

### Data collection

#### Instruments and variables

A baseline questionnaire was designed by the researcher to gather participants' socio-demographic and clinical data on maternal age, educational level, occupation, marital status, family income, mode of birth, whether women attended parenting training, baby gender, baby health scores (baby health status by their mothers' self-report), baby fussiness scores (a baby with a difficult temperament such as irritability and low soothability and manageability by their mothers' self-report), and how satisfied women were with the experience of 'Doing the month'.

MSE was measured by the Self-efficacy in Infant Care Scale (SICS) (Prasopkittikun and Tilokskulchai, 2010). The revised version of SICS is composed of 46 items and four dimensions of self-efficacy in infant care: developmental promotion, general health care, safety, and diet. The response scale representing the strength of self-efficacy uses the 0–100 confidence continuum. The scale is scored by summing the numerical ratings for each task and dividing by the number of tasks.

The higher the score a mother acquires indicates the higher the level of MSE she has. The Cronbach's alpha coefficient was 0.96 for the entire scale and ranged from 0.86–0.96 for its dimensions. Test-retest reliability was 0.85 (Prasopkittikun and Tilokskulchai, 2010). The Cronbach's alpha coefficient of the Chinese version of SICS was 0.95 for the scale and ranged from 0.80–0.93 for its dimension. The CVI (Content Validity Index) of the Chinese version scale was 0.98; and the CVI of all items was 0.8–1.0 (Zang and Shen, 2010).

The postnatal depression symptoms of primiparous women were assessed using the Edinburgh Postnatal Depression Scale (EPDS) (Cox et al., 1987). This scale is widely used to identify symptoms of postnatal depression throughout the world (Hewitt et al. 2009). It includes 10 items, with a 4-point Likert-type scale (0–3) and a total score of 0–30 (where 0 indicates better health). The Cronbach's alpha coefficient of the Chinese version of the EPDS was 0.87 (Wang et al., 2009).

Primiparous women's postnatal social support was measured by the Postpartum Social Support Scale (PSSS) (Lu and Zheng, 2001), which is composed of 20 items, measuring four dimensions: emotional support, informational support, material support and evaluation of support. It uses a 4-point Likert-type scale (0–3) and a total score of 0–60 is possible. A higher score indicates that a mother receives more social support. The PSSS was developed for Chinese women and is commonly used to measure the social support for Chinese women after childbirth. The content validity of this tool was 0.90 and the Cronbach's alpha was 0.89 (Lu and Zheng, 2001).

#### Data collection process

The baseline questionnaires to measure participants' socio-demographic and clinical characteristics were distributed to participants face-to-face by the researcher on the obstetric wards at three days postnatally, and participants' e-mail, address and phone number, were also collected. The baseline questionnaires and participants' contact details were completed and returned to the researcher by participants on the same day. Then the 6-week questionnaires (including the SICS, the EPDS, the PSSS, the experience of 'Doing the month', baby health, and baby fussiness) and the 12-week questionnaires (including the SICS, the EPDS, the PSSS, baby health, and baby fussiness) were sent by e-mail or mail (depending on the participant's choice) to participants at six weeks and at 12 weeks postnatally. In order to improve the response rate, a text or telephone call reminder (depending on the participant's choice) was given to participants at five and seven weeks postnatally during the 6-week questionnaire distribution; and at 11 and 13 weeks postnatally during the 12-week questionnaire distribution.

#### Data analysis

Before data analysis, data were entered, checked and cleaned by the researcher. After the dataset was closed, statistical analysis was completed using SPSS (Statistical Package for Social Sciences) Statistics 21.0.

In this study, descriptive statistics were used to summarise the baseline characteristics of participants including socio-demographic and clinical information (Rugg, 2007). For example, categorical variables such as maternal educational level and occupation were described using frequencies and proportions, and continuous variables such as maternal age were shown using means and standard deviations (SD). Inferential statistics allow researchers to draw conclusions or inferences from the quantitative data (Rugg, 2007). In order to identify the potential variables that can predict MSE, multivariate analysis of MSE (regression) was conducted, as regression analysis can estimate the relationships among variables when focusing on the relationship between a dependent variable and one or more independent variables (Li and He, 2013).

In this study, the MSE scores (continuous data) as the dependent variable, and the other variables as independent variables were entered into the multiple linear regression model ( $\alpha_{\text{entry}} = 0.05$ ,  $\alpha_{\text{removal}} = 0.10$ )

to identify the factors which influenced MSE at six and 12 weeks postnatally. Diagnostic tests for assumptions including linearity, normality, homoscedasticity, independence and model specification were completed and these assumptions were met for the multiple linear regression models in the analysis. According to requirements of coding the independent variables in multiple regression models, the polytomous independent variables (more than two categories) were established as dummy variables to represent different comparison groups. The continuous independent variables were maintained with the original numerical value as an assigned coding in the model. In terms of the dichotomous (binary) variables, one variable was coded as 1 and the other was code as 0. The forward stepwise method of the multiple linear regression analysis was used in this study. (Li and He, 2013).

#### Ethical considerations

Ethical approval for this study was granted from the Faculty of Medicine and Health Sciences at the University of Nottingham in April 2013. Ethical approvals for this study were granted from the three Hospitals in Xiamen City, China in April and May 2013. Three ethical issues, including protecting confidentiality/anonymity, informed consent, and protecting primiparous women from potential harm, were considered when conducting this study.

#### Results

In total 420 baseline questionnaires were distributed and 416 with usable data were returned (response rate: 99.0%, 416/420) at three days postnatally. The time taken for participants to complete the baseline questionnaire was approximately five minutes. After socio-demographic and clinical data were collected, 416 6-week questionnaires were distributed by e-mail to participants at six weeks postnatally and 304 completed 6-week questionnaires were returned by e-mail (response rate: 73.1%, 304/416). The time taken for participants to complete the 6-week questionnaire was approximately 15 minutes according to participants' self-report. At 12 weeks postnatally, 416 questionnaires were distributed by e-mail to participants and 214 completed 12-week questionnaires were returned by e-mail (response rate: 51.4%, 214/416). The time taken for participants to complete the 12-week questionnaire was approximately 15 minutes according to participants' self-report. Reasons for non-response at the two time points were the text reminders not being received; participants indicating by text that they had no time to complete questionnaires; participants choosing not to be followed up by text message; and some participants giving no reason.

The 416 participants in this study were recruited from various backgrounds. The mean age of these women was 27.28 (SD = 3.22) years. Over half (61.3%, 255/416) of women had a university or college education; 70.0% (291/416) of participants had a skilled occupation; 42.1% (175/416) of women had a family income of more than 5000yuan/per month/per person. Almost half (49.8%, 207/416) of participants had a normal vaginal birth; 62.5% (260/416) of women stated they had attended parenting training; and 55.3% (230/416) of women had a boy baby. These participants had similar socio-demographic and clinical characteristics to Chinese women. For example, the average maternal age of Chinese first-time mothers was 26.24 years, more than half (52.4%) of Chinese women attended a university or college, and 54.0% of Chinese women had a baby boy (National Bureau of Statistics of China, 2016). There were no statistically significant differences in socio-demographic and clinical characteristics between responders and non-responders at six and 12 weeks postnatally.

The mean MSE score at six weeks postnatally was 74.92 (SD = 11.05), and increased to 77.78 (SD = 11.13) at 12 weeks postnatally. The mean social support scores at six and 12 weeks postnatally were 40.99 (SD = 9.31) and 43.00 (SD = 9.55) respectively. The mean EPDS scores decreased from 9.09 (SD = 4.33) at six weeks postnatally to 8.63

**Table 3.1**

Dependent and independent variables in multiple linear regression model for multiple analysis of MSE scores.

Dependent variable	Independent variables
● Mean MSE scores	<ul style="list-style-type: none"> <li>● Maternal age</li> <li>● Maternal educational level</li> <li>● Maternal occupation</li> <li>● Family income</li> <li>● Mode of birth</li> <li>● Whether women attended parenting training</li> <li>● Baby gender</li> <li>● Baby health scores</li> <li>● Baby fussiness scores</li> <li>● Women's satisfaction with 'Doing the month' scores</li> <li>● Postnatal depression symptoms (EPDS scores)</li> <li>● Social support (PSSS scores)</li> </ul>

(SD = 4.40) at 12 weeks postnatally. The mean score of how satisfied women were with 'Doing the month' was 68.73 (SD = 17.65) at six weeks postnatally. The mean baby health scores were 85.37 (SD = 12.45) and 86.68 (12.48) at six and 12 weeks postnatally, respectively; and the mean baby fussiness scores were 77.06 (SD = 17.59) and 79.03 (SD = 14.66) at the two time points.

### The multiple linear regression model

Dependent and independent variables in the multiple linear regression model are described in Table 3.1.

### The coding of independent variables entered in the multiple linear regression model

The polytomous independent variables (more than two categories) including educational level, occupation, family income and mode of birth were established as dummy variables in this study (Li and He,

2013). These dummy variables were coded 1 for participants who are in the remaining groups (excluded the reference group) and all others were coded 0 (Li and He, 2013). The continuous independent variables including maternal age, baby health scores, baby fussiness scores, EPDS scores and PSSS scores were maintained with the original numerical value as an assigned coding in the model. In terms of the dichotomous (binary) variables including baby gender and whether women attended parenting training, a boy baby was coded as 1 and a girl baby was code as 0; and attended parenting training was coded as 1 and not attending parenting training was coded as 0. The coding of independent variables ( $n = 8$ ) and dummy variables ( $n = 10$ ) entered in multiple linear regression model in this study are shown in Table 3.2.

### Collinearity diagnostics

Multicollinearity has been highlighted by statisticians (Friendlya and Kwana, 2009; Li and He, 2013) as a problem when undertaking regression models. It is said that the Variance Inflation Factor ( $VIF = 1/\text{Tolerance} = 1/(1-R^2)$ ) greater than 10 are a sign of multicollinearity (Friendlya and Kwana, 2009; Manual of Collinearity diagnostics, 2010). The higher the VIF value is, the more severe the problem is (Manual of Collinearity diagnostics, 2010). In this study, there was no VIF value greater than 5, suggesting that there was no problem of collinearity in this study.

### The multivariate analysis results of MSE scores at six weeks postnatally

In total seven independent variables were entered into the multiple linear regression model. Apart from baby fussiness scores ( $t$  test,  $P > 0.05$ ), the other six variables were statistically significant predictors of MSE scores ( $t$  test,  $P < 0.05$ ); and these six variables explained 51.0% of variance in MSE scores (Adjusted  $R^2 = 0.510$ ,  $F = 46.084$ ,  $P < 0.001$ ) (Table 3.3). The multiple linear regression equation at six weeks postnatally was: MSE scores = 36.530 + 0.406 PSSS scores + 0.147

**Table 3.2**

The coding of independent variables and dummy variable entered in multiple linear regression model.

Independent variables	Methods of coding
Maternal age	Original numerical value
Education level (middle school or lower)	
Education level 1	Middle school or lower = 0, High school = 0, University/College = 0, Master degree or higher = 1
Education level 2	Middle school or lower = 0, High school = 0, University/College = 1, Master degree or higher = 0
Education level 3	Middle school or lower = 0, High school = 1, University/College = 0, Master degree or higher = 0
Occupation (unemployed status)	
Occupation 1	Unemployed status = 0, Professional occupation = 0, Skilled occupation = 0, Unskilled occupation = 1
Occupation 2	Unemployed status = 0, Professional occupation = 0, Skilled occupation = 1, Unskilled occupation = 0
Occupation 3	Unemployed status = 0, Professional occupation = 1, Skilled occupation = 0, Unskilled occupation = 0
Family income (< 3000)	
Family income 1	< 3000 = 0, 3001–5000 = 0, > 5000 = 1
Family income 2	< 3000 = 0, 3001–5000 = 1, > 5000 = 0
Mode of birth (normal vaginal birth)	
Mode of birth 1	Normal vaginal birth = 0, Assisted delivery = 0, Caesarean section = 1
Mode of birth 2	Normal vaginal birth = 0, Assisted delivery = 1, Caesarean section = 0
Whether women attended parenting training	No = 0, Yes = 1
Baby gender	Girl = 0, Boy = 1
Baby health scores	Original numerical value
Baby fussiness scores	Original numerical value
Women's satisfaction with 'Doing the month' scores	Original numerical value
Postnatal depression symptoms (EPDS scores)	Original numerical value
Social support (PSSS scores)	Original numerical value

\* Reference group.



**Table 3.3**

The multiple linear regression analysis results of MSE scores at six weeks postnatally (n = 304).

Variables	Unstandardised Coefficients		Standardised Coefficients	t	P
	B	Std. Error			
Constant	36.530	4.372		8.355	0.000
Social support (PSSS) scores	0.406	0.062	0.342	6.508	0.000
Satisfaction with 'Doing the month' scores	0.147	0.031	0.235	4.701	0.000
EPDS scores	-0.356	0.124	-0.139	-2.871	0.004
Education 2	3.101	0.931	0.136	3.331	0.001
Baby health scores	0.101	0.041	0.114	2.484	0.014
Occupation 3	4.242	1.853	0.095	2.289	0.023
Baby fussiness scores	0.052	0.028	0.083	1.843	0.066

F = 46.084, P = 0.000, Adjusted R<sup>2</sup> = 0.510.

Women's satisfaction with 'Doing the month' scores – 0.356 EPDS scores + 3.101 Educational level + 0.101 Baby health scores + 4.242 Occupation.

#### *The multivariate analysis results of MSE scores at 12weeks postnatally*

In Table 3.4, five independent variables were entered into the multiple linear regression model. The five variables were statistically significant predictors of MSE scores (t test, P < 0.05); and explained 48.5% of variance in MSE scores at 12 weeks postnatally (Adjusted R<sup>2</sup> = 0.485, F = 41.082, P < 0.001). The multiple linear regression equation at 12 weeks postnatally was: MSE scores = 42.510–0.725 EPDS scores + 0.303 PSSS scores + 0.168 Baby health scores + 0.105 Women's satisfaction with 'Doing the month' scores + 0.087 Baby fussiness scores.

## Discussion

In this study, several factors had influenced MSE in the sample of Chinese primiparous women during the initial postnatal period, including social support, women's satisfaction with 'Doing the month', postnatal depression symptoms, maternal education, maternal occupation, baby health, and baby fussiness.

#### *Social support and MSE*

The results of this study demonstrated that social support was an important factor which influenced MSE at six and 12 weeks postnatally. The result highlighted the potential significance of social support in improving MSE levels for Chinese first-time mothers during the postnatal period, which was consistent with the previous studies undertaken in Western countries (Haslam et al., 2006; Leahy-Warren et al., 2012), Singapore (Shorey et al., 2014, 2015), and Beijing (Zang and Shen, 2010) of China.

The following theoretical and empirical evidence may explain how social support could positively influence MSE. According to Bandura (1997)'s theory, social support may impact on MSE through processes involving vicarious experience, verbal persuasion, and physiological and emotional status. Vicarious experience was a type of support whereby support providers assisted new mothers through modeling an effective parenting behaviour; for example, nurses or family members showed women how to soothe a crying infant effectively (Haslam et al., 2006). Bandura (1997) commented that watching others successfully

**Table 3.4**

The multiple linear regression analysis results of MSE scores at 12 weeks postnatally (n = 214).

Variables	Unstandardised Coefficients		Standardised Coefficients	t	P
	B	Std. Error			
Constant	42.510	5.342		7.958	0.000
EPDS scores	-0.725	0.141	-0.287	-5.128	0.000
PSSS scores	0.303	0.068	0.260	4.444	0.000
Baby health scores	0.168	0.048	0.188	3.470	0.001
Satisfaction with 'Doing the month' scores	0.105	0.033	0.180	3.145	0.002
Baby fussiness scores	0.087	0.040	0.115	2.177	0.031

F = 41.082, P = 0.000, Adjusted R<sup>2</sup> = 0.485.

perform parenting tasks may shape better expectations for women's own performance and increase women's maternal confidence. Verbal persuasion involved aspects of both informational and appraisal support (Haslam et al., 2006). For instance, support providers supply first-time mothers with parenting advice and information about infant rearing, which may increase their MSE levels directly (Leahy-Warren, 2005). Additionally, supporters who gave women material and emotional support such as time, money, love, trust and encouragement in baby care may positively affect mothers' state of mind and physiology; and consequently strengthen their parenting self-efficacy in their role as a new mother (Tarkka, 2003).

#### *Women's satisfaction with 'Doing the month' and MSE*

Chinese women had a special experience of 'Doing the month' during the first month postnatally, which was distinct from women in Western countries. Therefore, whether this practice affected Chinese women's MSE was worthy of being researched to fill the research gap. According to the results of this study, women's satisfaction with 'Doing the month' was one main factor influencing MSE at six and 12 weeks postnatally. Some reasons probably accounted for this result. First of all, women who were satisfied with 'Doing the month' could have had a good physical and mental recuperation from childbirth, such as resulting from eating good nutritious food, avoiding housework, having a good rest and strengthening family ties. According to the theory of Bandura (1997), good physiological and emotional states positively impacted on MSE scores. Secondly, during the period of 'Doing the month', women's mother or mother-in-law accompanied them and possibly gave them useful suggestions for nurturing the baby. The verbal persuasion likewise could have increased new mothers' role competence (Bandura, 1997). Therefore, women with a higher satisfaction level with 'Doing the month' were more likely to have a higher mean MSE score.

#### *Postnatal depression symptoms and MSE*

According to the findings in this study, postnatal depression symptoms was an important factor influencing MSE for Chinese primiparous women at six and 12 weeks postnatally. This research result was consistent with most of the prior studies undertaken in different countries (Gao et al., 2012; Kohlhoff and Barnett, 2013; Shorey et al., 2015). In contrast, the research by Porter and Hsu (2003) conducted in the USA found that MSE was no longer significantly related to maternal postnatal depression at 12 weeks postnatally. The inconsistent results were explained by Porter and Hsu (2003) due to the relatively low-risk and demographically restricted nature of the

sample (mainly Caucasian, middle-class, well-educated women with a very high level of MSE), these women could be exhibiting fairly high levels of adaptiveness to the parenting transition, leading to less depressive mood states in comparison to what might be found among more representative populations. Therefore, the conclusion drawn by Porter and Hsu (2003), that MSE measured postnatally demonstrated a disassociation with postnatal depression, could be questioned as their sample only focused on well-educated women with a higher level of MSE, lacking representativeness.

Some factors possibly accounted for the phenomenon, wherein the more depression symptoms the mother experienced, and the lower MSE level she had. First of all, women with postnatal depression symptoms often exhibited uneasiness, irritability, confusion, forgetfulness, anxiety and guilt (Dennis and Creedy, 2004); and these negative emotional states resulted in a lack of parenting confidence and unrealistic expectations of motherhood (Dennis and Creedy, 2004), which severely decreased the mothers' capability to cope with the care of babies (Murray et al., 2003). Secondly, women with postnatal depression symptoms usually experienced fatigue, insomnia and poor appetite (Craig and Howard, 2009), and these disadvantaged physical conditions limited maternal capacity to engage in parenting tasks (Murray et al., 2003). These results also were supported by Bandura (1997)'s theory, and he argued that the negative physiological and emotional status of women suppressed their MSE levels. Therefore, women who have postnatal depression symptoms, likewise, could experience guilty feelings about taking care of their new baby (Craig and Howard, 2009) because of their low MSE levels, and vice versa (Davey et al., 2011).

#### *Educational level and MSE*

The different educational levels of mothers in this study had an influence on MSE scores at six weeks postnatally. Mothers with a higher educational level had a higher mean MSE score, which was consistent with the results of previous studies undertaken in Western countries (Jackson, 2000; Green and Rodgers, 2001). This may be due to higher education enhancing the acquisition and use of health knowledge (Mostafavi, 2009), so that women with a university degree or higher were predisposed to learning and seeking more knowledge and information about infant care than women with a high or middle school degree during the pregnancy and the postnatal period. Furthermore, the furtherance of education could be assumed to empower women to make better decisions about many baby parenting tasks such as basic hygiene and nutrition (Currie and Moretti, 2003).

In contrast, other research showed that maternal education was not associated with MSE scores for Singaporean mothers from the first to third days postnatally (Shorey et al., 2015), and for Chinese women in Beijing (Zang and Shen, 2010) and Guangzhou (Gao et al., 2014) at six weeks postnatally. The probable reason for the inconsistent results was that these three studies only focused on well-educated women. For example, most of the three studies' samples (more than 82%) had at least a university educational level (Zang and Shen, 2010; Gao et al., 2014; Shorey et al., 2015), which may have made it impossible to distinguish the difference in MSE scores among the imbalanced and skewed education level groups.

The interesting finding in this study was that maternal education only remained in the multiple linear regression model at six weeks postnatally, but not in the regression model at 12 weeks postnatally. This demonstrated that maternal education did affect MSE, but only in the shorter term, not in the longer term. For instance, the advantages of women with a higher educational level on MSE (such as the better acquisition and use of parenting knowledge) would disappear as women with different educational levels acquired increasing childcare experiences, information and confidence with the passage of time. This was consistent with the research findings with a longer follow up, wherein maternal education had no statistically significant association

with MSE at six months postnatally for women in Hong Kong (Ngai and Chan, 2012) and at eight months postnatally for women in Finland (Tarkka, 2003). Thus, the conclusion could be drawn that the maternal educational level affected MSE at six weeks postnatally, but not in the long term, such as at 12 weeks postnatally.

#### *Maternal occupation and MSE*

The findings presented in this study indicated that different maternal occupations affected the mean MSE score at six weeks postnatally. For example, mothers with professional work had a significantly higher mean MSE score than mothers with a skilled job, unemployed mothers, and mothers with an unskilled occupation. Other studies conducted in Western countries had similar findings, wherein mothers with professional work had a relatively high MSE level compared with mothers with casual work (Koniak-Griffin et al., 2006); and employed mothers had greater MSE than unemployed mothers (Jackson, 2000). There were two factors that may have contributed to this. Firstly, mothers with an unskilled job or unemployed mothers were more likely to lack parenting knowledge and skills because of their comparatively lower educational levels in comparison with women with professional work or a skilled job. Secondly, unemployed mothers may have acquired less help than ones with professional or skilled work, who could access supports from the workplace and colleagues, thus affecting their perceived parenting competence (Jackson, 2000; Koniak-Griffin et al., 2006).

However, this result was in contrast with some previous research (Zang and Shen, 2010; Gao et al., 2014). For example the research by Zang and Shen (2010) and Gao et al. (2014) conducted in Beijing and Guangzhou in China indicated that MSE was not associated with maternal occupation at six weeks postnatally. The explanations for the inconsistent results with this study were possibly that the study conducted by Zang and Shen (2010) only focused on the differences in MSE scores between employed mothers and unemployed mothers, and only 9.5% of the participants were unemployed which made it difficult to distinguish MSE scores between the two imbalanced occupational groups. The study by Gao et al. (2014) had a small sample size (96 women), and all participants in that study were employed mothers.

The other interesting finding of this study was that maternal occupation did not remain in the multiple linear regression model at 12 weeks postnatally. This result implied that compared with other major influencing factors such as postnatal depression symptoms and social support, maternal occupation did not have an important effect on MSE with the passage of time. A study by Ngai and Chan (2012) undertaken in Hong Kong also demonstrated that employment status was not associated with MSE at six months postnatally. Therefore, the conclusion could be drawn that the maternal occupation affected MSE at six weeks postnatally, but its influence on MSE decreased or even disappeared in the longer term, because women with different occupations had increasing parenting experience and improving confidence in taking care of their baby with the passage of time.

#### *Baby health and MSE*

In this study, it was firstly found that baby health was an influencing factor of MSE scores for the sample of Chinese primiparous women. The women who perceived their baby had better health status scored higher on MSE that were concurrently measured at the two time points. This result was consistent with other research findings undertaken in Finland (Salonen et al., 2009). The reasons were possibly that the baby health status deeply impacted on maternal physiological and emotional states, which affected MSE according to Bandura (1997)'s theory. Furthermore, babies' well-being also could have increased maternal confidence. For instance, first-time mothers were prone to being quite competent in mothering when their babies were very healthy and did not have any problems (Ngai et al., 2011). Therefore,

from six weeks to 12 weeks postnatally, mothers who had perceived their baby had better health status accounted for a significantly positive variance in reported MSE scores in this study.

### Baby temperament and MSE

In this study, it is firstly found that baby temperament impacted on MSE scores for the sample of Chinese primiparous women. Mothers who reported that they had a less fussy, irritable baby had a higher mean MSE score that were concurrently measured at six and 12 weeks postnatally, which was consistent with the previous research findings conducted in Western countries (Denis et al., 2012; Troutman et al., 2012). The relationship between infant temperament and MSE was probably explained in the context of what Bandura (1982) referred to as perceived task difficulty as well as outcome expectancies.

For instance, when new mothers were successful in their attempts to soothe and comfort their baby, they were more likely to acquire a greater sense of maternal confidence in this endeavour (Stifter and Bono, 1998). However, infants with a negative or difficult temperament had characteristics such as fussiness, irritability, and frequent intense crying, coupled with low soothability and manageability (Stifter and Bono, 1998), which possibly increased the difficulties of tasks in caring for them. Therefore, women were prone to suffering from more disappointments when taking care of babies with a difficult temperament, and if parenting tasks were repeatedly unsuccessful, they were likely to feel less effective in their caregiving abilities (Porter and Hsu, 2003; Troutman et al., 2012). Moreover, Liu et al. (2012) found that infants' difficult temperament could increase their mothers' maternal parenting stress, which would suppress maternal role competence. Therefore, women having a baby with a difficult temperament were more likely to have a lower level of MSE in this study.

### Strengths and limitations

The strengths of this study are a longitudinal design with a good representative sample, a high recruitment rate and an acceptable response rate, the use of sound instruments with a high validity and reliability, and statistically scientific analysis. These strengths can be seen to reduce selection bias, information bias, measurement error and confounding. Furthermore, this study's findings explained approximately 50% of the total variance in MSE scores at the two time points which indicated the model's good explanatory power, much higher than 20%-30% explanatory variance achieved in other studies (Zang and Shen, 2010; Azmoude et al., 2015).

However, the 50% explanatory variance highlights that some potentially other unknown factors which may affect MSE could not have been accounted for. Therefore qualitative studies are recommended in order to explore MSE and its influencing factors more deeply in the future. Moreover, owing to financial and time limitations, this study focused on two time points of six weeks and 12 weeks postnatally. In addition, the study sample was related to women in Xiamen City in Fujian Province of China which limits the generalisability of the findings.

### Conclusion and implication

Obstetric nurses and women's own family members, such as husbands and mothers-in-law/mothers, need to be aware of and acknowledge the significant contribution of social support and women's satisfaction with 'Doing the month' to positively influence primiparous women's MSE. They also need to be aware of the significantly negative effect of postnatal depression symptoms on first-time mothers' MSE during the postnatal period. Moreover, obstetric nurses and women's family members should be more aware of women likely to have relatively low MSE levels in this context: primiparous women with lower education, unemployed mothers, women with unskilled occupations, women with

an unhealthy baby, and women having a baby with a difficult temperament.

Qualitative studies are recommended to explore, for example, the views of Chinese primiparous women on what they feel affects their own MSE, and the perspectives of health professionals, women's husbands and mothers/mothers-in-law. Moreover, there is a need for a longitudinal study to be undertaken in other Provinces of China, including the time points of six months and one year postnatally, to assess the factors influencing MSE among Chinese women.

### Conflict of interest

None.

### Ethical approval

Ethical approval for this study from the Faculty of Medicine and Health Sciences at the University of Nottingham was granted in April 2013. Ethical approvals for this study from the three Hospitals in Xiamen City, China were granted in April and May 2013. Three ethical issues, including protecting confidentiality/anonymity, informed consent, and no harm for primiparous women, have been considered when conducting this study. REC ref: S14032013 SNMP OVS.

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